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Food service workers' self-reported food preparation practices: an EHS-Net study

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Abstract

This study was conducted by the Environmental Health Specialists Network (EHS-Net), a network of environmental health specialists and epidemiologists at federal and state health agencies, whose mission is to improve environmental health practice. One of EHS-Net's primary goals is to improve the understanding of the underlying causes of foodborne illness using a system-based approach. As part of this ongoing effort, EHS-Net analyzed data from a telephone survey of food service workers designed to increase our understanding of food preparation practices (a cause of foodborne illness) in restaurants. Results indicated that risky food preparation practices were commonly reported. Respondents said that at work they did not always wear gloves while touching ready-to-eat (RTE) food (60%), did not always wash their hands or change their gloves between handling raw meat and RTE food (23% and 33%), did not use a thermometer to check food temperatures (53%), and had worked while sick with vomiting or diarrhea (5%). Several factors were associated with safer food preparation practices. Workers responsible for food preparation reported washing their hands and wearing gloves when handling RTE food more often than workers not responsible for food preparation. Workers who cooked reported changing their gloves more often than workers who did not cook. Older workers and managers reported washing their hands more often than younger workers and non-managers. Workers in chain restaurants more frequently reported using thermometers than workers in independently owned restaurants. This study provides valuable information concerning the prevalence of food preparation practices and factors that may impact those practices. Additional research is needed to better understand those factors.
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Keywords: Food safety; Food handling practices; Food preparation practices; Food service workers; Handwashing

Introduction

Foodborne illness is a significant public health issue – the Centers for Disease Control and Prevention (CDC) estimated that 76 million foodborne illnesses occur annually in the United States (Mead et al., 1999).

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Research suggests that foodborne illness is associated with eating outside the home – case–control studies have found that people with foodborne illnesses were more likely to have eaten outside the home than their non-ill controls (Hennessy et al., 2004; Sobel et al., 2000), and surveillance data indicate that a significant percentage of reported foodborne outbreaks are associated with restaurants (Olsen et al., 2000). Additionally, epidemiological research has identified several foodborne illness risk factors related to food preparation practices in food service establishments (e.g., inadequate cooking, poor personal hygiene) (Bryan, 1988).

The Environmental Health Specialists Network (EHS-Net) was formed to conduct research on foodborne illness and to use the knowledge gained from this research to improve the practice of environmental health in relationship to foodborne illness. EHS-Net is a network of environmental health specialists and epidemiologists at the Centers for Disease Control and Prevention's (CDC) National Center for Environmental Health (NCEH), the United States (US) Food and Drug Administration (FDA), the US Department of Agriculture (USDA), and eight state health departments (California, Colorado, Connecticut, Georgia, Minnesota, New York, Oregon, and Tennessee). EHS-Net's research activities are based on the systems approach, whereby the focus of the research is on the system as a whole and the underlying factors that determine how the system operates. Thus, much of EHS-Net's activities are designed to improve our understanding of the underlying causes of foodborne illness. Given evidence of links between eating outside the home, food service worker food preparation practices, and foodborne illness, EHS-Net's current research efforts are focused on increasing our understanding of food preparation practices in restaurants and how those practices relate to foodborne illness. In the future, EHS-Net will extend its work to address other aspects of the farm-to-table continuum associated with foodborne illness.

EHS-Net uses various methods to collect data on food preparation practices in restaurants and their link to foodborne illness, including surveillance of foodborne illness risk factors in restaurants (Lee et al., 2002), surveys of restaurant managers concerning specific food preparation practices and policies (Lee et al., 2004), and focus groups with restaurant workers concerning factors related to safe food preparation (Green and Selman, 2003). The data from these studies contribute to our understanding of why foodborne illness occurs in restaurants.

As part of this ongoing effort, EHS-Net conducted a study in which survey respondents who worked in food service facilities were asked a series of questions about their food preparation practices. The study provides information on the self-reported prevalence of these food service workers' safe and unsafe food preparation practices, and on factors associated with those practices.

Methods

Data source

EHS-Net developed a series of survey questions to be asked of food service workers concerning their food preparation practices. These questions were added to the FoodNet Population Survey, a survey conducted periodically by the Foodborne Diseases Active Surveillance Network (FoodNet) on a variety of topics, including respondents' food consumption practices, health status, and demographic characteristics. Like EHS-Net, FoodNet is also a collaborative research project of the CDC, FDA, USDA, and state health departments, and is focused on the epidemiological investigation of foodborne disease.

Sample

The FoodNet Population Survey uses a probability sample, which allows for statistical estimates to be made for the population from which the sample was drawn. The survey was conducted in the nine FoodNet sites (the eight EHS-Net sites and Maryland) from March 2002 to February 2003. The survey was administered using methods similar to that of the CDC's Behavioral Risk Factor Surveillance System (BRFSS) telephone survey methods (CDC, 1998). The sample was selected from households with telephones using a single-stage, random-digit dialing technique. One respondent was randomly selected from each household contacted. Interviews were conducted in English or Spanish to accommodate respondents.

As in BRFSS methods, the data were weighted by the number of eligible respondents and telephone lines in each household to compensate for unequal probabilities of selection, as those who live in households with fewer occupants or more phone lines have a larger probability of selection than those who live in households with more occupants or fewer phone lines. Using 2000 US census figures, the data were also weighted by age, gender, and FoodNet site to ensure that the survey sample was demographically representative of the FoodNet sites. Thus, the weighted results from this survey can be generalized to the population of the FoodNet sites.

Questions about food handling responsibilities and practices

The FoodNet Population Survey contained several hundred questions on a variety of topics. Due to

concerns about participant fatigue, it was decided to ask some of these questions of only half of the sample, randomly selected, to limit the amount of time respondents spent completing the survey. The set of EHS-Net food service worker questions that are of interest to this study was one such set of questions. Those respondents randomly selected to receive the EHS-Net questions and who were over the age of 15 years were asked if they were currently working or had worked in a restaurant or other type of food service facility in the previous year. Respondents who answered "yes" to this question were asked a series of questions about their food service work. They were asked about their work responsibilities (e.g., cooking, serving, etc.), the type of restaurant for which they worked (independently owned restaurant, chain or franchise restaurant, or another type of restaurant) and their behavior concerning the following four food preparation practices that the FDA recommends food service workers adopt to prevent foodborne illness (FDA, 2001): handwashing; using gloves to prevent cross contamination of ready-to-eat (RTE) food, defined as food that can be eaten without further cooking or additional preparation; checking cooking temperatures of foods to ensure they reach appropriate temperatures; and restricting workers from working with food when they are ill with vomiting or diarrhea. It is important to note that this study assessed only glove use as a method for the prevention of cross contamination, although the FDA has recommended several additional methods for prevention of cross contamination, such as the use of deli tissue, spatulas, tongs or dispensing equipment.

To assess the extent of handwashing, all food service worker respondents were asked to estimate the number of times they washed their hands during an 8-h shift. To assess the extent of glove use, workers who handled RTE foods at work were asked how often they wore disposable gloves while touching RTE foods (never, sometimes, almost always, always). They were also asked to estimate the number of times they changed their gloves during an 8-h shift.

To assess the extent to which workers engaged in safe practices concerning handwashing and glove use, respondents who handled raw meat or poultry and RTE foods were asked how often (never, sometimes, almost always, always) they washed their hands and changed their gloves (if they wore gloves) between touching RTE foods and raw meat or poultry. To assess the extent to which workers checked cooking temperatures with a thermometer, those who said they were responsible for cooking were asked how they checked the doneness of cooked foods. Finally, to assess the extent to which workers limited working with food when ill, respondents were asked if, in the past year, they had worked in a restaurant or other food service facility while experiencing diarrhea or vomiting.

Data analysis

Descriptive data were first examined to determine food service workers' demographic characteristics and self-reported levels of safe food preparation practices. Relationships among food preparation practices and demographic (age and gender) and job characteristics (restaurant type, work responsibilities) were then examined with bivariate analyses (t-tests) to identify factors associated with safe food preparation. A regression model was also created to assess the effects of job characteristics on safe food preparation practices, while controlling for demographic characteristics. Significance test values were obtained using SUDAAN version 8.1 survey data analysis software. Any differences that were not significant at the 0.01 level or less were considered not statistically significant.

Results

Of the 16,435 participants surveyed in the total FoodNet Population Survey, approximately half of these ($n = 8,206$) received the EHS-Net food service worker questions. The Council of American Survey Research Organizations (CASRO) upper-bound response rate, which includes information on those respondents who completed the interview, refused to interview, or terminated the interview before completion (but not those who were unable to be contacted), for this survey was 47.4%. Four hundred and eighty-six of these respondents that were over the age of 15 years were currently working or had worked in a restaurant or other type of food service facility in the previous year. The estimate, based on this figure, of the proportion of the survey population over the age of 15 years that had worked in a food service facility in the previous year is 8.4% (95% confidence interval (CI) = 7.5–9.3%).

Demographic and job characteristics

Descriptive statistics, including sample sizes, frequencies, and 95% CIs for those frequencies, were generated to determine the demographic and job characteristics of the food service workers in the sample and are included in Table 1. Note that the frequencies, means, and CIs provided in all tables in this paper are weighted population estimates based on the survey sample. Seventy-five percent of the sample was White, 53% were female, 24% had not completed high school, 31% had a high school diploma, and 45% had at least some college (including associate and technical degrees). The estimated median age of the FoodNet food service worker population was 24 years ($n = 481$, 95% CI = 22.4–26.1).

Table 1. Survey population estimates of food service workers' characteristics

	Sample *n*	Weighted population %	95% confidence interval
Education			
Less than high school	71	23.6	17.6–29.4
High school diploma	140	31.4	26.0–36.8
Some college	153	27.0	22.4–31.7
College degree	114	18.0	14.3–21.8
Total	*478*	*100.0*	
Gender			
Male	206	47.1	41.3–52.9
Female	280	52.9	47.1–58.7
Total	*486*	*100.0*	
Race			
White, non-Hisp.	380	75.0	69.4–80.7
Black/African American, non-Hisp.	46	11.9	6.9–16.8
Hispanic	37	9.3	6.1–12.5
Am. Indian/Alaskan native, non-Hisp.	6	0.7	0.1–1.4
Asian/Pacific islander, non-Hisp.	10	3.0	0.6–5.3
Other	1	0.1	0.0–0.3
Total	*480*	*100.0*	
Type of restaurant[a]			
Chain	149	45.9	39.1–52.7
Independent	160	40.0	33.6–46.4
Other (institutions, volunteer orgs., etc.)	54	14.1	9.7–18.5
Total	*363*	*100.0*	
Responsibilities[b]			
Cooking	205	43.5	37.7–49.3
Preparation	217	48.3	42.5–54.1
Managing	109	18.7	14.7–22.6
Total	—	—	

[a]This question was added after the first quarter of data were collected; thus, the *n* is smaller than for the other variables.

[b]Every respondent was asked about each responsibility; thus, for each responsibility, the denominator is the total number of respondents – 486.

An estimated 46% of food service workers worked in chain restaurants, 40% worked in independent restaurants, and 14% worked in other types of establishments, such as institutions. Workers were responsible for a variety of activities, including cooking, food preparation, such as making salads or sandwiches (as opposed to cooking), and managing.

Prevalence of food preparation practices

Descriptive statistics were conducted to determine the frequency with which food service workers reported engaging in specific food preparation behaviors (see Table 2). Of those workers who handled RTE food at work, 40% said they always wore gloves while touching

Table 2. Survey population estimates of self-reported food service workers' food handling behaviors

	Sample *n*	Weighted population %	95% confidence interval
Handle RTE			
Yes	263	52.9	47.1–58.7
No	223	47.1	41.3–52.9
Total	*486*	*100.0*	
Wear gloves when touching RTE food[a]			
Never	91	33.6	26.7–40.5
Sometimes	28	14.0	8.1–19.9
Almost Always	35	12.0	7.5–16.6
Always	109	40.4	33.0–47.6
Total	*263*	*100.0*	
Handle RTE food and raw meat or poultry			
Yes	171	33.7	28.4–39.0
No	315	66.3	61.0–71.6
Total	*486*	*100.0*	
Wash hands between touching raw meat or poultry and RTE food[b]			
Never	9	5.8	1.2–10.5
Sometimes	7	8.6	13.3–15.9
Almost always	13	8.3	3.6–13.1
Always	142	77.3	68.4–86.0
Total	*171*	*100.0*	
Change gloves between touching raw meat or poultry and RTE food[c]			
Never	15	11.6	5.2–18.0
Sometimes	7	9.5	1.8–17.3
Almost Always	12	11.7	4.8–18.6
Always	95	67.2	56.9–77.7
Total	*129*	*100.0*	
Method of checking doneness[d]			
Visual check	47	23.7	16.3–31.3
Touch	9	4.2	1.1–7.2
Timer	32	22.4	14.4–30.5
Thermometer	101	47.3	37.7–56.9
Other	3	2.4	0.3–4.9
Total	*192*	*100.0*	
Worked while sick with diarrhea or vomiting			
Yes	22	4.7	2.5–6.9
No	462	95.3	93.1–97.5
Total	*484*	*100.0*	

[a]Asked only of those who handled RTE foods.

[b]Asked only of those who handled RTE foods and raw meat/poultry.

[c]Asked only of those who handled RTE foods and raw meat/poultry, and who wore gloves.

[d]Asked only of those who said they were responsible for cooking.

RTE food. The average number of times that food service workers who wore gloves and handled RTE food reported changing their gloves in an 8-h shift was 15.6 times ($n = 127$, 95% CI = 12.1–19.1). The average number of times that food service workers reported washing their hands during an 8-h shift was 15.7 times ($n = 420$, 95% CI = 14.0–17.4).

Of those respondents who indicated that they handled both RTE food and raw meat or poultry at work, 77% said they always washed their hands and 67% said they always changed their gloves between touching raw meat and poultry and RTE food. Workers who cooked at work reported several different methods for determining the doneness of cooked foods – the majority, 47%, said they used a thermometer. Workers also said they used visual cues (e.g., cutting into food to check the color), touch (e.g., touching the food with fingers to determine its firmness), and timers for this purpose. Almost 5% of the workers reported that in the past year, they had worked in a food service establishment while sick with vomiting or diarrhea.

Bivariate analyses

Bivariate analyses were conducted to determine if there were significant differences in self-reported food preparation practices by age in years, education, gender, restaurant type, and work responsibilities (managing, preparation, and cooking). Specifically, we tested for differences in the average number of times respondents said they washed their hands and changed their gloves in an 8-h shift, and the frequency with which respondents reported: using a thermometer to check the doneness of cooked foods; always wearing gloves when touching RTE food; and always washing their hands and changing their gloves between touching raw meat or poultry and RTE food. These analyses were not conducted for the demographic variable of race and the practice variable of working while sick, as the cell sizes for these analyses would be too small (<30).

There were no significant differences in reported food preparation practices by education or gender ($ts < 1.9$, NS). However, there were significant differences in practices by age, restaurant type, and work responsibilities, as can be seen in Tables 3 and 4. Workers 25 years of age and older reported washing their hands and changing their gloves significantly more often in a shift than did workers under 25 years of age. Managers and those who prepared food reported washing their hands significantly more often in a shift than did non-managers and those who did not prepare food. Those who cooked reported changing their gloves significantly more often in a shift than those who did not cook. A significantly larger proportion of workers in chain restaurants, compared to independently-owned

Table 3. Differences by age, restaurant type and work responsibilities in average self-reported handwashing and glove changing in an 8-h shift

	Average number of times hands washed in 8-h shift				Average number of times changed gloves in 8-h shift[a]			
	Sample *n*	Weighted population mean	95% confidence interval	*t* values	Sample *n*	Weighted population mean	95% confidence interval	*t* values
Age								
⩾25	250	18.8	16.1–21.5	3.4**	82	20.6	15.1–26.1	3.0**
<25	170	13.0	11.1–14.9		45	10.8	7.3–14.3	
Restaurant type[b]								
Chain	136	14.9	11.7–18.2	0.9	—	—	—	—
Independent	134	17.1	14.1–20.1		—	—	—	
Responsible for cooking								
Yes	174	17.0	14.3–19.6	1.2	81	18.7	13.9–23.4	2.2*
No	246	14.8	12.5–17.0		46	11.3	6.6–16.0	
Responsible for preparation								
Yes	188	18.3	15.3–21.3		82	17.5	12.9–22.1	1.5
No	231	13.3	11.5–15.1	2.8*	45	12.4	7.3–17.5	
Responsible for managing								
Yes	94	23.1	18.8–27.4	3.9**	36	19.3	12.4–26.2	1.3
No	325	13.9	12.2–15.7		90	14.1	10.2–18.0	

*Significant at 0.01, **significant at 0.001.

[a]Asked only of those who handled RTE foods and wore gloves.

[b]The difference in the average number of times gloves were changed by restaurant type was not tested, as the ns were too small (<30).

Table 4. Differences by age, restaurant type and work responsibilities in the self-reported proportion of respondents who use thermometers and wear gloves

	Use thermometer to check doneness[a]				Always wear gloves when touching RTE food[b]			
	Sample *n*	Weighted population %	95% confidence interval	*t* values	Sample *n*	Weighted population %	95% confidence interval	*t* values
Age								
⩾25	70	44.0	27.9–60.1	0.7	94	37.7	25.8–49.6	0.7
<25	122	50.7	40.0–61.4		169	42.7	33.8–51.6	
Restaurant type								
Chain	61	56.5	39.8–73.2	2.2*	76	36.4	23.7–49.0	1.3
Independent	56	31.9	18.0–45.8		65	24.5	11.8–37.2	
Responsible for cooking[c]								
Yes	—	—	—	—	133	45.5	35.2–55.8	1.4
No	—	—	—		130	35.3	24.8–45.7	
Responsible for preparation								
Yes	144	51.6	40.5–62.8	1.7	150	50.8	41.3–60.4	3.4**
No	47	34.9	19.6–50.2		113	26.6	16.5–36.7	
Responsible for managing								
Yes	57	52.5	37.3–67.7	0.7	70	42.9	29.4–56.3	0.5
No	134	45.3	33.6–57.1		192	39.2	30.6–47.8	

*Significant at 0.01, **significant at 0.001.

[a]Asked only of who said they were responsible for cooking.

[b]Asked only of those who handled RTE foods.

[c]The difference in thermometer use by cooking responsibilities could not be tested, as only those who cooked were asked about thermometer use.

restaurants, reported using a thermometer to determine the doneness of cooked foods. A significantly larger proportion of workers who prepared food, in comparison to workers who did not, reported that they always wore gloves when touching RTE food. There were no significant differences by any variables in the proportion of workers who said that they always washed their hands and changed their gloves between touching RTE food and raw meat or poultry ($ts < 1.9$, NS); thus, these data are not presented.

Multivariate analyses

Correlational analyses revealed that age was significantly associated with having management ($r = 0.10$, $p < 0.01$) responsibilities. Thus, a regression model was generated to determine if the significant relationship between management responsibilities and the average number of times workers reported washing their hands in an 8-h shift remained significant after controlling for age. The regression results indicated that, after controlling for age, the average number of times hands were washed in an 8-h shift was still positively and significantly associated with having management responsibilities ($\beta = 8.7$, standard error $= 2.3$, $t = 3.7$, $p < 0.003$). These results indicate that both age and work responsibilities are independently associated with safe food handling practices.

Discussion

Results from this study indicate that 8.4% of the survey population over the age of 15 had worked in a food service facility in the year prior to the survey. This number is similar to the US Department of Labor's estimate of the proportion of US workers who are employed in food preparation and serving-related occupations – 8.0% (US Department of Labor, 2004). These concurring figures indicate that a significant portion of the US population works in the food service industry.

Findings from this study also indicate that food service workers commonly reported risky food handling practices. A quarter of workers said they did not always wash their hands and a third said they did not always change their gloves between touching raw meat or poultry and RTE food. Failure to wash hands or change gloves between touching raw meat or poultry and RTE food increases the risk of cross contamination, and are considered to be unsafe food handling behaviors.

In comparison to the above figures, a considerably larger percentage of workers said that they did not always wear gloves while handling RTE food. However, there are several methods, other than glove use, through which cross contamination from bare hands can be prevented, including the use of deli tissue, spatulas, tongs, or dispensing equipment. As this survey did not collect data on the use of these items, it is not possible to determine if the food service workers used any of these items instead of gloves. Additionally, some contend that using gloves or utensils to prevent bare hand contact with RTE food is not necessary as long as proper handwashing occurs. Given the differing methods available for preventing cross contamination from bare hands and the differing viewpoints on the necessity of preventing bare hand contact with gloves, it is perhaps not surprising that the percentage of workers who reported not wearing gloves while touching RTE food was relatively high.

More than half of the respondents indicated that a thermometer was not the method they used most often to check the doneness of cooked foods. The FDA provides recommended cooking temperatures for a variety of foods, particularly meats and poultry, to ensure that food reaches a temperature high enough to kill pathogens. Checking temperatures with a thermometer helps ensure that food meets these recommended temperatures. Our results suggest, however, that workers use a variety of methods, other than a thermometer, to determine when food is sufficiently cooked. Workers said they checked the doneness of cooked foods by the length of time the food cooked and by the appearance and feel of the food. In some cases, such as when the cooking procedure has been verified to result in proper temperatures, using the length of time that the food has cooked may be an appropriate means of ensuring doneness, whereas the appearance or feel of the food is likely to be a less accurate measure.

A small percentage of workers reported working while sick with vomiting or diarrhea. However, this figure is a cause for concern, as ill workers can potentially expose large numbers of customers to their illnesses. At least one study has found that infected food service workers were implicated in a significant portion of the outbreaks included in the study (Bryan, 1988).

Several factors were found to be associated with safe food handling practices, including respondent age, work responsibilities, and the type of restaurant in which respondents worked. Older workers compared to younger ones and those with management responsibility compared to those without such responsibility reported washing their hands more often. These associations may reflect the impact of experience or knowledge on food preparation. Older workers and managers are likely to be experienced, and therefore may handle food more safely than inexperienced workers. Similarly, it is likely that older workers and managers know more about food safety than their counterparts, and this knowledge leads to safer food preparation. Indeed, some research indicates that there an association between knowledge and training and safe food handling practices (Campbell et al., 1998; Geller et al., 1980). More research is needed to determine the relationships among the variables of age, management responsibility, experience, food safety knowledge, and safe food handling. Survey studies that collect data on all these factors and observation studies that examine the food handling practices of workers of varying age and experience would be particularly useful in the further exploration of these relationships.

Those responsible for food preparation, compared to those who were not, more often reported wearing gloves when touching RTE food. They also reported a higher average rate of handwashing per shift. Additionally, those who cooked reported changing their gloves more often than those who did not cook. These findings suggest that work duties may influence safe food handling practices. Those with more intensive food handling responsibilities may be more concerned about food safety, and thus more likely to take precautions by wearing gloves, changing their gloves, and washing their hands when needed. Alternatively, those with more intensive food handling responsibilities may simply be more likely to get food on their hands, and in response, wash their hands frequently and/or wear gloves to remove or avoid the food, not because they are concerned about food safety. Again, more research is needed to understand this relationship.

Those in chain restaurants, compared to those in independent restaurants, were more likely to report using thermometers to determine food doneness. Anecdotal evidence suggests that in restaurant chains, there are often multiple workers in multiple restaurants conducting similar activities; thus, restaurant chains establish routine procedures such as checking temperatures with thermometers to standardize cooking practices and ensure consistency across restaurants. This may explain the link between chain restaurants and thermometer use.

The strengths of the present study include a survey design that allows inferences to be generalized to the survey population. Indeed, we are not aware of other population-based surveys of food service workers. A limitation of the present study is that it collected self-reported data. Self-reported data are susceptible to social desirability bias, a tendency for people to over-report their engagement in socially desirable behaviors. As safe food handling is probably considered by most to be a socially desirable behavior, it is likely that food service workers over-reported the extent to which they engaged in safe food handling behaviors. Another limitation of this study is that it uses a cross-sectional design, which does not allow us to make causal inferences about the

relationships among variables. Additionally, survey respondents included only those who spoke English or Spanish; thus, workers who did not speak those languages were excluded from the survey.

This EHS-Net study increases our knowledge and understanding of food service worker preparation practices. The results indicate that we must continue to work toward improving food service workers' food preparation behaviors. Public health researchers and practitioners have encouraged food safety training for workers as a means of improving food preparation practices. Some studies have found that food safety training is positively related to safe preparation practices (Cotterchio et al., 1998; Nabali et al., 1986; Tebbutt, 1992). However, other studies have found that even when food service workers demonstrate good knowledge of food safety, they do not always engage in safe preparation practices (Clayton et al., 2002; Howes et al., 1996). These findings suggest that other factors, in addition to knowledge and training, influence preparation practices. To further advance food safety, we need to identify and develop an understanding of these factors (Ehiri and Morris, 1996; Foster and Kaferstein, 1985). The study presented here provides a preliminary assessment of some of these factors, but more research is needed.

The ongoing work by EHS-Net is increasing our understanding of these factors. It will also enhance our understanding of how food service workers' food preparation practices are related to foodborne illness. These results can then be used to develop more effective food safety policies and foodborne illness prevention efforts.

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